REVIEWS.

ART. XI.—*A Treatise on Fractures in the Vicinity of Joints, and on Certain Forms of Accidental and Congenital Dislocations.* By ROBERT WILLIAM SMITH, M.D., M.R.I.A., Lecturer on Surgery at the Richmond Hospital School of Medicine, &c. &c. Dublin, 1847: 8vo. pp. 314.

NOTHING impresses the thoughtful student of medicine more profoundly than the apparent exhaustlessness of the subjects of his investigations. Enthusiasm and industry may have expended their energies upon a single department of the science; yet, compared with what remains to be known, they seem to him to have acquired nothing. He is constantly reminded of the beautiful ballad of Schiller, in which a spirit is represented as flying in quest of the last limit of creation. The adventurous voyager passed innumerable worlds in his flight; but ever, as he wandered on, star after star continued to sparkle up before him. At last, wearied with his fruitless pursuit, and seeing the same infinity before as behind him, he returned, convinced that "Creation flows on to no shore."

The subject of fractures and dislocations well illustrates this. Notwithstanding the many excellent treatises by the most celebrated professors of surgery, we have before us another volume which corrects many erroneous impressions, develops new facts and principles, and awakens inquiring thoughts on those very topics concerning which we fancied that we were best informed.

The importance of the questions which the author investigates renders the reviewing of his labours a pleasing task. We shall follow his chapters in their own order. The *first* treats of "The diagnosis and pathology of fractures of the neck of the femur."

Fracture of the neck of the femur is *usually* characterized by an array of symptoms and appearances which serve sufficiently to indicate the kind of injury which has been suffered. They must be observed while the patient is in the recumbent posture, and also when he is standing. In the former position, it will be found that the injured limb is shorter than the other, always measuring from the anterior superior spinous process of the ilium to the point of the internal malleolus; that the foot is everted; that the knee-joint is a little flexed; that the inguinal region is unusually full, while the upper and outer part of the thigh presents a degree of prominence, and a degree of tension, which are wanting in the other limb; that the trochanter major stands out in less bold relief than on the sound thigh, is approximated to the crest of the ilium, and revolves in the segment of a smaller circle than the other, when each limb is in turn rotated; that the contraction of the muscles about the hip can be overcome by steady and continued extension from the foot and leg, the shortened limb restored to its natural length, the foot inverted again, and a sound and feeling of crepitus produced by rotating the broken bone; but the unnatural appearances all recur when the extending force is withdrawn. The patient complains of pain in the thigh, particularly about the hip-joint; and this is aggravated by any attempt of the surgeon to rotate the foot inwards, and to flex the thigh upon the pelvis; motions which the patient himself cannot accomplish at all, or not without much labour and assistance, and suffering: while, on the other hand, he can increase the eversion of the foot, and extend the limb. All these signs are much increased in degree, if the patient is made to stand upon the uninjured leg, supported by an assistant. But, as Mr. Smith remarks, p. 5, "these symptoms are each liable to so many important varieties, and are so modified by the situation of the fracture, the relative position of the fragments, and the extent of injury done to the soft parts entering into the composition of the articulation, or in its immediate vicinity, that it becomes necessary to examine somewhat in detail the more important symptoms, and to consider attentively the circumstances which, in any given case, may modify the signs, and obscure the nature, of the injury which the hip-joint has suffered." "The majority of the symptoms of fracture may be present in cases in which the neck of the femur is uninjured; and, on the other hand, the fracture may be unaccompanied by the more important of the usual diagnostic signs. We cannot, in investigating these injuries, form our opinion, guided by any particular symptom; for there is not one which, separately considered, can be looked upon as unequivocally indicating the existence of a fracture of the neck of the femur; it is by the union of all that we can alone hope to arrive at a correct diagnosis."

The author, then, starting with this just conviction of the necessity of severe and unprejudiced examination of facts and statements, in the endeavour to arrive at the truth, proceeds to scrutinize the symptoms of fracture of the neck of the femur, and the effects of this injury, as described by others, and as observed by himself.

The literature of this subject is sufficiently extensive. Among the French authorities, are Boyer, Desault, Dupuytren, Chassaignac, Cloquet, Cruveilhier, Rodet, Vidal de Cassis. Among the English, Sir A. Cooper, Earle, Stanley, King, Colles, Adams, Amesbury, Lonsdale, Langstaff, Guthrie; and not a few among the Germans. In addition to a careful examination of such writers, Mr. Smith has diligently studied the appearances presented in one hundred and forty cases of fracture of the neck of the femur, sometimes during the life of each individual sufferer and after death, sometimes only after the patient's death. And, in order that others may have the opportunity of comparing his statements with the truth, he has succinctly narrated the histories of a great many cases, and has appended to each of them a beautifully executed drawing, exhibiting the situation of the fracture, and the subsequent changes which have occurred in the bone. Upon the facts thus gathered from many sources, Mr. Smith reasons fairly, closely, and, we think, conclusively. We shall endeavour to convey a just impression of his views.

It would seem to require only an unprejudiced observation of cases of fracture of the cervix femoris, to determine whether there is the greater amount of shortening of the limb in the *intra-capsular*, or in the *extra-capsular*, variety of this injury. And yet, on this point, a very great difference of opinion exists on the part of high authorities. Sir Astley Cooper is probably regarded in England, and also in this country, as the most oracular judge of this question; and his opinion is that, in the *intra-capsular* fracture, the shortening is from *one to two* inches (*Treat. on Frac. and Disl.*, p. 113, Am. ed.); while in the fracture external to the capsule, " the injured leg is shorter than the other by one-half to three-fourths of an inch." (*Op. cit.*, p. 144.) In this statement, Amesbury, Chassaignac, Vidal, and some others, substantially agree with Cooper; while, on the other hand, it is opposed by Stanley, Earle, Boyer, and others, who aver that the greater shortening occurred in the *extra-capsular* fracture. Rodet contends that this difference of opinion depends upon the fact that there is no constancy in the degree of shortening consequent upon these varieties of fracture. Our author dissents from this inference, and feels "satisfied that the degree of shortening of the limb may, *with certain precautions*, be considered as diagnostic of the seat of the fracture, and that it is greater when the lesion is external to than when it is within the capsular ligament," p. 6; reference being had to the retraction which *immediately* succeeds the occurrence of the injury. That Sir Astley Cooper intends the same limitation is manifest from his statement, that the shortening may, after a length of time, in consequence of gradual extension of the capsular ligament, amount to *four inches.* (*Op. cit.*, p. 114.) In the treatise before us, Mr. Smith estimates the shortening which *directly* follows the fracture within the capsule at "from a quarter of an inch to one inch"—p. 110. An examination of the statistical table of the cases of this variety of the injury, which is appended to his remarks, and a comparison of these with their published histories, support the above opinion. The number of cases of this injury, advanced at page 108, is *twenty-eight*, and in only *ten* of this number did the shortening *exceed one inch;* of these, the retraction was one and a half inches in two cases, one and a quarter inches in four, two inches in three, and two inches and a half in one. Now, by referring to the notes of these cases at pp. 69–84, it will be found that in all of them *absorption* of the neck of the bone had taken place, to a greater or less extent, sometimes entirely; thus proving that the excess of the shortening beyond the degree mentioned as the extreme of *immediate* retraction was due to changes occurring subsequently to the receipt of the injury—changes which had been going on from "*one month*" to "several years."—p. 108.

The question very pertinently arises, how can this difference in the degree of retraction of the broken limb be accounted for, the kind of injury being the same in the different cases? "The chief circumstances," says Mr. Smith, p. 6, "according to which the degree of shortening varies in cases of intracapsular fractures, are, the direction of the fracture and relative position of the fragments, and the amount of laceration suffered by the fibrous covering of the neck of the bone." The former condition applies to those instances in which the line of fracture is such that the drawing up of the lower fragment is prevented by the opposed surface of the upper fragment, there having been no displacement with regard to the diameters of the two portions. However, as the line of direction of the rupture of the fibres of the bone can only be distinguished by a post-mortem examination, it is comparatively little interesting practically, excepting in so far as a knowledge of the possibility of such a condition should prevent the surgeon from deciding too hastily that no fracture exists, simply because there is little or no shortening of the limb. The other circumstance which has been considered as preventive of the usual amount of shortening, namely, the escape of the fibrous investment of the neck of the bone from laceration to any considerable extent, is one of more importance, because it is more likely to arise than the former, and because its occurrence may be more readily and more safely supposed; and, moreover, if the before-mentioned happy obliquity in the line of fracture should take place, such a condition is more probable as a coincident event with that now under consideration. Concerning this firm envelope of the neck of the femur, the author thus remarks, p. 7: "This important investment constitutes a cylindrical sheath of great strength, extending from the inferior attachment of the capsular ligament to the circumference of the cartilage of the head of the femur; it is derived from the deep fibres of the capsule, and, here and there, appears to be thrown into longitudinal folds or bands, which Weitbrecht has termed 'retinacula;' it is covered upon its external surface by synovial membrane, and numerous vessels pass along it to the head of the bone. It may, for convenience' sake, and from the function which it fulfils in many cases of fracture within the capsule, be termed *the cervical ligament of the femur.*" If, as sometimes happens, the force which causes the rupture of the osseous fibres has exhausted itself in so doing, this so-called cervical ligament may remain intact, and will thus secure to the fragments of the bone two very important conditions for the complete reparation of the injury; viz., perfect apposition, and a medium for the transmission of nutritious matter, since blood-vessels ramify in this membrane previous to entering the bone, and "*the reserve power,*" as Mr. Paget happily expresses it, which dwells latent in every tissue, for purposes of self-preservation and reparation, will be exerted in the enlargement, and probably in the multiplication, of these vessels. It is not unlikely that, if a record of the condition of this fibrous investment of the neck of the femur, after the occurrence of the accident in question, had been kept, in all the instances published of bony union of the fragments, it would have been found to have escaped laceration, at least to a considerable extent; and it will readily be conceived that this condition of the membrane may be associated with the favourable obliquity of the fracture before spoken of, in which the line runs from the inferior part of the base of the head obliquely upwards and outwards, thus furnishing a double cause for the continued apposition of the fragments.

Instances of non-separation of the two portions of the broken neck of the femur, from one or both of the causes, are recorded by Sir B. Brodie (in *Cooper, op. cit.*, p. 114), Stanley (*Med. Chir. Trans.*, vol. xiii.), Cruveilhier (*Anat. Pathol. Livraison,* xxvi.); these facts are cited by Mr. Smith. In addition to these, Dr. Mussey, the distinguished professor of surgery, in Cincinnati, has a specimen illustrative of the same condition. It is with great propriety, therefore, that Mr. Smith, as well as other wise surgeons, insists on the importance of not resorting to undue violence or diligence in the attempt to elicit crepitus in cases in which there is reason to apprehend the existence of fracture of the femur within the capsule of the hip-joint, and the expediency of enjoining strict rest, and confinement in bed, for as great a length of time as if the crepitus had been heard and felt. The following case, reported by Mr. Stanley (*Med. Chir. Transact.*, vol. xiii.), is quoted by Mr. Smith, and its appositeness renders it worth repeating here. "A man, aged 60, was knocked down in the street, and, on his admission into St. Bartholomew's Hospital, shortly after the accident, he complained of pain in the hip; but there was neither shortening nor eversion of the limb, and its several motions could be executed with freedom and power. In this absence of all the usual indications, a fracture was not suspected; the patient was, therefore, merely confined to his bed. At the end of a fortnight, he had an attack of inflammation in the intestines, from which he recovered, but suffered a relapse, and died in the fifth week from the date of the accident. On examining the body, no trace of injury was found in the parts around the hip-joint; but, on opening the capsule, small effusions of blood, apparently not recent, were discovered beneath the synovial and fibrous membranes covering the neck of the femur, also beneath the synovial membrane covering the ligamentum teres. The head and neck of the bone were sawed through the middle, and in each portion a dark line, evidently occasioned by the effusion of blood, was seen extending through the bone at the basis of the neck. A fracture was discovered extending along this line; but the broken surfaces were in contact, and the synovial and fibrous membrane covering the neck of the bone was uninjured."—p. 9.

Another cause assigned by the author for the limitation of the shortening in intra-capsular fractures is the strong capsular ligament which embraces the joint so closely. In this opinion, the author, it must be remarked, is at variance with that of Sir A. Cooper and others, since, according to these gentlemen, the *intra-capsular* fracture is attended with more shortening than that which is *external* to the joint. But we think that his reasons for this belief are much more satisfactory than those urged in favour of the opposite view by its upholders In the first place, we have the positive testimony of facts, as adduced in the table at p. 109, by which it is seen that, of *fifteen* cases of *extra-capsular* fracture, unaccompanied by impaction of the upper fragment into the cancellated structure of the lower, whereby the retraction of the latter would have been limited, all display a degree of shortening *exceeding one inch* (which is the limit assigned by the author to the retraction of the lower fragment in the *intra-capsular* fracture, and which, we have seen, agrees with his tabular statement), varying from an inch and a quarter to two inches. Secondly, the probability is in favour of the same view. The capsular ligament is rarely sufficiently lacerated to permit of the lower fragment escaping through the aperture; and it therefore seems exceedingly improbable that the unruptured ligament, unless previously relaxed and lengthened by some chronic disease, as in the case mentioned by Mr. Langstaff (*Cooper*, p. 114), could permit of a degree of retraction of the lower fragment upwards at all commensurate with that produced in *extra-capsular* fractures by the power exerted upon it by the muscles which are inserted into it.

Mr. Smith cites one of Sir A. Cooper's cases of extra-capsular fracture (Cooper, *op. cit.*, p. 149, Case 93), in which the shortening did not amount to quite three-quarters of an inch; but in this case, as the author remarks, p. 11, Sir Astley has "entirely overlooked the influence which the circumstance of the fracture having been impacted exerted upon the shortening of the limb," by preventing the full effect of muscular contraction. And, by referring to the other cases of this accident, recorded by Cooper (*op. cit.*, p. 145, *et seq.*), it will be found that in all of them in which he had the opportunity of examining the bone after death, a similar impaction existed. On these grounds, therefore, we feel inclined to side with the author of the treatise under consideration, rather than with Cooper and his partisans.

Mr. Smith believes "that *all extra-capsular* fractures are, in *the first instance*, also *impacted* fractures, and that all impacted fractures are necessarily accompanied by a fracture traversing some part of the trochanteric region." "I have," he says, "omitted no opportunity of investigating this point, and have now examined, here and elsewhere, upwards of one hundred specimens of the extra-capsular fracture, and have found in all, without a single exception, a second fracture traversing some portion of the inter-trochanteric space. This space is of a somewhat semilunar shape, bounded above by the summit of the trochanter major, below by that of the trochanter minor. Its concavity corresponds to the posterior inter-trochanteric ridge, and its convexity to a line drawn from the base of one trochanter to the other." "The second fracture usually begins near the centre of the summit of the trochanter major, passes from thence downwards and inwards, generally following the convexity of the space I have mentioned, and either terminates before it reaches the trochanter minor, or else it is continued through the centre or below the base of that process. Sometimes, it is a fissure, which splits either one or both trochanters, without detatching any portion of either. This second lesion of the bone is the necessary result of the forcible impaction of the broken cervix into the shaft of the femur, and it is, probably, the second fracture in order of time. What occurs appears in fact to be this: the neck of the femur is, in the first instance, broken by the fall on the hip, and then driven into the cancellated tissue between the trochanter by the weight of the body and the prolonged action of the first shock. But, as soon as the neck of the bone is broken, the femur is rotated outwards, even before the action of the first impulse has ceased; thus, the posterior inter-trochanteric ridge being thrown forwards is forcibly driven against the base of the neck of the femur. Two forces, therefore, combine to produce the fracture through the inter-trochanteric space, one of which consists in the impaction of the cervix into the shaft, while the other is found in the collision which takes place between the broken neck of the bone and the posterior inter-trochanteric ridge; and, moreover, this second fracture is as constantly present in cases attended with rotation of the foot *inwards.*"—pp. 16–17. The degree of separation between the fragments thus produced must vary according to circumstances. The violence which caused the fracture may be so great as entirely to sever the trochanters from the shaft, and to set free the upper fragment from its nidus in the reticulated tissue between them, in which event there is nothing to prevent the effect of the contraction of the powerful muscles which pass from the pelvis to the shaft of the femur, and great shortening of the limb must result, as in the ordinary extra-capsular fracture. This complete severance and dislocation may be prevented by the cause of the fracture being less violent in its action, and by the escape from extensive laceration of the dense fibrous investment of the whole trochanteric region. We can even conceive, contrary to the opinion of the author, that, in consequence of a comparatively slight violence occasioning the fracture, there might be little derangement of the fragments in the diameter of the shaft, and consequently little or no rupture of the firm fibrous envelope of the neck about the trochanters. In such a case, there would not necessarily be positive impaction of the neck in the cancellated structure, and the shortening would be proportionally small. And it is not unreasonable to think, that the senile atrophy and diminution in the powers of resistance of the osseous fibres would favour such a happy escape in those instances in which, as is sometimes the case, the injury occurs in elderly people; because in these a less degree of violence is required to break the bone. However, this fortunate category of suppositive coincidences rarely happens in actual life; this is the exception, the other the general rule.

Mr. Smith's remarks concerning the period at which shortening of the limb occurs, and the attendant circumstances, are very clear. There is considerable variety in both of these particulars. "It may manifest itself instantaneously upon the receipt of the injury, and that to a considerable degree. In such cases, the injury will generally be found to be a comminuted fracture *external* to the capsule, a fracture which has lacerated the whole of the fibrous structures which invest the trochanteric region of the femur."—p. 11. In other instances, the shortening of the limb is by no means decided or evident for several days, in consequence of the paralyzed condition of the muscles from contusion. Again, the primary retraction may have been slight, but, after the expiration of some weeks or months, the shortening has become considerable, *gradually*, owing to the absorption of the neck of the bone. In Case No. 9 of the table of intra-capsular fractures, the shortening was at first only a quarter of an inch; but, at the end of six weeks, it amounted to an inch and a half, from this cause. Other cases occur in which at first there is but trifling inequality in the length of the limbs; but, at the end of an indefinite time, a considerable retraction of the broken thigh takes place *suddenly*, and synchronously with some unusually severe rotation or other motion of the limb. This last series of cases the author supposes to be instances of *intra-capsular* fracture, in which "the cervical ligament," as he terms it, had escaped laceration at the time of the injury, but, at this subsequent period, had been torn by some sudden movement, and had thus permitted the fragments to pass each other.—p. 12. This same immunity from primary shortening, with subsequent *sudden* retraction, may be attendant also upon those cases in which the line of the fracture was such that the lower fragment could not pass the upper until displacement had been occasioned by some violent motion of the limb. The interesting point is that, in the opinion of the author, "the *sudden* occurrence of shortening, at a period more or less remote from the receipt of the injury, is diagnostic of the existence of a fracture within the capsular ligament."

The position of the foot, in fractures of the neck of the femur, receives due consideration from the author.—pp. 22–27. This is not a question of speculative interest merely. Probably the records of every large and long-established hospital, and the note-books of many old surgeons, will show that fracture of the neck of the femur has been more than once mistaken for dislocation of the head of the bone; and, perhaps, many lives have been shortened by excessive perseverance in endeavouring to reduce this imaginary injury. Such an error of diagnosis is very likely to result from the *inversion* of the foot, which sometimes accompanies fracture of the cervix femoris; and the danger of such a mistake is increased when a portion of the trochanter major is detached, and drawn upwards, so as to simulate the head of the thigh bone. Many explanations have been offered to account for this unusual direction of the foot, but as yet none has been devised which will apply to all cases. The weight of the limb and the powerful influence of the rotator muscles outwards sufficiently elucidate the *eversion* of the foot; but any position may be assumed between this extreme and its opposite, *inversion*, both in the intra-capsular and extra-capsular fracture, but more frequently in the latter variety—in *five* cases of seven which the author has examined. It may remain undeviated from its natural direction when, in consequence of the circumstances before mentioned, there has been little or no displacement of the broken surfaces as regards their diameter; or when, as in the case quoted from Mr. Amesbury, at p. 25, the fibres of the firm investment of the neck have been preserved unruptured on its anterior face; it may be inverted when, as Mr. Guthrie suggests, the line of fracture is such that the powerful muscles, which rotate the thigh outwards, can no longer act upon the lower fragment. But these explanations apply only to individual cases. The author says that, in every case of fracture of the neck of the femur which he has had the opportunity of examining after death, and in which there was *inversion* of the foot, the inferior has been placed in front of the superior fragment; and he suggests that, in these cases, the inversion of the foot may have been due to the fact that, in consequence of this position of the lower fragment, the direction of the fibres of the outer rotator muscles may have been so changed as to render them rotators inwards. He admits, however, that this explanation will scarcely apply to inversion of the lower fragment in intra-capsular fractures, "for, in such cases, it is difficult to conceive how the lower fragment could be thrown so far forwards as to affect the action of the muscles, by altering the direction of their fibres." This suggestion, which attributes more influence to the position of the bones, primarily, than to the muscles, receives confirmation from an observation which is original with the author; namely, in some instances of fracture of the neck of the femur, accompanied by inversion, when the shortening had been removed by extension, and the direction of the foot rectified, so soon as the extending force had ceased to act, the shortening recurred, but the foot became *everted;* and he justly urges, with Cruveilhier, that, if muscular agency caused the inversion in the first instance, the same result should always follow its exercise.—p. 25.

With respect to the means of distinguishing between the intra-capsular and the extra-capsular fracture, the author insists upon the necessity of careful examination of *all* the symptoms. The most reliable points may be thus summed up:—

1. The *extra-capsular non-impacted* fracture may generally be recognized by the existence of an amount of shortening varying from one inch to two and a half inches; by eversion of the foot; by the comparative ease with which the limb may be restored to its natural length, when, by rotation, crepitus can be elicited, with the recurrence of shortening, accompanied sometimes by *eversion* of the foot, if the latter had been at first *inverted;* by the often great degree of pain about the hip, and the ecchymosis, visible externally, being more marked than in the intra-capsular fracture; by the very complete loss of power of the limb.

2. The *extra-capsular impacted* fracture is usually indicated by "slight shortening of the limb; slight eversion of the foot; absence of crepitus; great difficulty in all cases, and in the majority of instances an impossibility, of removing the shortening of the limb by extension; and by less loss of power than in other forms of fracture of the neck of the femur."—p. 32. In addition to these circumstances, subsidiary means of diagnosis exist in the conditions insisted upon by Cooper, particularly; namely, that the fractures external to the capsule are generally occasioned by a severe injury, and occur at a less advanced age than those within the joint. Moreover, the existence or absence of the symptoms indicative of chronic disease of the hip-joint should be ascertained in order to guard against error from this source.

3. The *intra-capsular* fracture may be distinguished by the *immediate* shortening being only from a quarter of an inch to one inch, and by this retraction being easily overcome by extension; by the facility with which crepitus may be produced; by the loss of power being generally complete; by the rarity of *inversion* of the foot, as compared with this position in the *extra-capsular impacted* fracture; by the age of the patient being beyond fifty years, and by the often slight violence which has occasioned the injury; finally, if *sudden* occurrence of shortening, or sudden *increase* of the shortening, be observed, at a period more or less remote from the date of the accident, the injury is, in all probability, a fracture *within the capsule.*

The anatomical characters of the two varieties of this fracture are detailed at considerable length, and very carefully.—pp. 32–68. We have not space sufficient to permit of a full transfer of the observations on these points. We can only notice briefly the most important.

The author has met with one specimen of extra-capsular fracture in which the lower fragment had penetrated a short distance into the cancellated tissue of the superior, the reverse of the general condition. Another example of the same kind is adduced by Mr. King, in the *Cyclopedia of Surgery.*

He has also studied the nature and uses of the exostotic growths which are often found after fractures external to the capsule, being deposited chiefly about the trochanters, and the lines which connect them. The usual opinion entertained of these excrescences is that they are produced for the purpose of affording a nidus, a species of socket, into which the neck of the bone may be received after the severance of its natural connections; or with the view of supporting the acetabulum when the weight of the body is borne by the injured limb. The author dissents from this very mechanical notion; "the final cause of their formation is the union of the fracture already described as traversing the inter-trochanteric space, and the constant existence of which, in cases of extra-capsular impacted fractures, has been overlooked by the generality of writers."—p. 40. If it be asked, why is bony matter deposited most abundantly here? the answer may, perhaps, be found by consideration of the interesting fact mentioned by Mr. Paget (*Lect. on Nutrition, London Med. Gaz.*, vol. v. p. 97), that excessive reparative growth in bone is always found most luxuriant about the original centres of ossification. Now, in the femur, the original points of ossification are, for the upper part of the bone, one at its head, and one for each trochanter. (*Quain and Sharpey.*)

After intra-capsular fractures, the post-mortem appearances are very various. We have nowhere seen them so amply narrated as in this treatise. We cannot, however, detail them; and the mere mention of them would not be at all satisfactory to a zealous inquirer. We must consequently refer such to the pages of the book itself.

We must mention, notwithstanding, that the author does not admit, so far as reason and experience allow him to judge, the existence of *partial* fracture of the cervix femoris, as described by Mr. Colles and Mr. Adams; but considers that the cases on which the conclusions of these gentlemen are based are instances of complete and impacted fracture.—pp. 44–52.

Touching the question of bony reparation in intra-capsular fracture, Mr. Smith adds his assent to the affirmative, and quotes several cases in support thereof. His remarks in this connection are full of interest. Alluding to the opinions of Mr. Bransby Cooper and Cruveilhier, who contend, the former "that it is ordained by nature, that fracture of the neck of the femur, within the capsular ligament, is *not* to unite by ossific deposition," and the latter "that bony union is here impossible, in consequence of the fragments not being surrounded by tissues capable of forming callus," the author says, p. 53, "Now I believe that both the authors just alluded to are in error, in supposing that the effusion of callus around the fragments is necessary for the union of this fracture; and must altogether dissent from the opinion which maintains that the ends of the broken bone take no part in accomplishing osseous union. How is union accomplished in *extra-capsular* impacted fracture? Surely it must be by the direct union of the two bony surfaces which are confronted to each other. The surrounding soft parts cannot be in any way concerned in the process; the osseous matter which we find effused along the posterior inter-trochanteric space being intended for the union, not of the broken cervix, but of the fracture through the trochanter, as has been already explained; and I believe that, whenever reparation by bone occurs in the intra-capsular fracture, it is owing to the direct union of the broken surfaces; and that the effusion of callus around the fragment is by no means essential to the process." In support of this opinion, which seems very reasonable and probable, he refers to the published cases of bony union of this fracture, all of which have been examples, he says, of one or other form of impacted fracture: either the lower fragment has penetrated the cancellated tissue of the head of the bone, or else the broken surfaces presented corresponding depressions and prominences which mutually accommodated each other, so that the fragments were as if dovetailed into each other, and thus kept in contact. And he adduces, in further confirmation of this view, the fact that, in fracture of the cranial bones, and of the patella, longitudinally, reparation takes place without the effusion of callus, by the direct union of the opposing surfaces.

The author concludes his remarks on the subject of fracture of the neck of the femur by a sententious summing up of the results of his studies :—

The second chapter of the volume gives an exceedingly instructive history of "chronic rheumatic arthritis of the hip-joint," its symptoms, and the anatomical lesions which characterize it. The post-mortem appearances are beautifully delineated, so as to illustrate the text, and to explain the phenomena witnessed during life, and the sources of error in diagnosis.

We pass to the third chapter, which considers "Fractures of the bones of the forearm, in the vicinity of the wrist-joint."—pp. 129–175. Of these accidents, by far the most common is the fracture of the lower extremity of the radius, accompanied by more or less displacement of the lower fragment backwards. Mr. Colles, before whose time this injury was generally considered as a dislocation of the lower extremity of the radius, called Desault's, from the distinguished French surgeon, who first pointed out its true character. His paper on the subject was published in the tenth vol. of the *Edinburgh Med. and Surg. Journal,* 1814; and the author of the treatise before us very justly complains that, for more than thirty years, subsequent writers have described "Colles' fracture," without alluding to the name and opinion of this gentleman in connection with it.

Mr. Smith's account of the pathology of this accident is the most complete and carefully drawn up of any that we have seen. It is scarcely needful for us to enumerate the symptoms as given by him, because these are generally familiar to surgeons. We shall repeat, as concisely as possible, his account of the post-mortem revelations, and these will sufficiently involve the appearances presented during life.

"The most usual seat of the fracture is from three-fourths of an inch to one inch above the radio-carpal articulation; sometimes it is only a quarter of an inch above the joint, but I have never seen it higher than one inch. It always *appears* to be higher than it really is; but, should the lesion take place at two inches, or two and a half inches, above the radio-carpal articulation, the injury no longer presents the peculiar and remarkable characters which distinguish Colles' fracture of the radius."—p. 137.

" The fracture is usually found to be *transverse,* even in cases where the external character of the injury would lead us to suppose that the bone had been broken very obliquely; this apparent obliquity is, however, the result of the mode of displacement of the lower fragment, which is drawn obliquely backwards in such a manner that the carpal surface of the radius, instead of having its normal direction downwards, forwards, and inwards, now looks upwards, backwards, and outwards, its anterior descending below its posterior margin, and the styloid process being raised and drawn backwards towards the side of supination. This twofold displacement is the result of the action of the supinator longus on the one part, and of the long extensors of the thumb upon the other; the latter, as soon as the resistance of the carpus is removed by the occurrence of the fracture, draw the lower fragment of the radius, with the carpus, towards the side of extension, thus directing the articulating surface of the radius upwards and backwards, while the supinator longus, besides supinating the lower fragment, also elevates the styloid process, giving the carpal surface an inclination outwards." "So long as the inferior radio-ulnar ligaments remain unbroken, and the lower end of the ulna is entire (which conditions are required by the particular fracture in question), it is obvious that the inferior fragment of the radius must be displaced *obliquely;* that, in fact, the styloid process (when being drawn upwards and backwards), must move through a portion of the circumference of a circle, and thus the upper end of the lower fragment is thrown towards the ulna. The pronator quadratus acts nearly altogether upon the superior fragment, for at least two-thirds of it are above the line of the fracture, and in some instances the solution of continuity of the bone is close to the inferior edge of this muscle.

"The displacement of the lower fragment backwards is very seldom carried to such an extent as to enable it to clear the inferior surface of the upper fragment."

With regard to the direction of the fracture, he says, "I have lately examined more than twenty specimens of the injury, and have not found one in which the bone had been broken with any considerable obliquity from above, either downwards and backwards, or downwards and forwards; in all of them, the anterior and posterior margins of the fractured surface have been nearly upon the same level, and the surface has been plane. There is, however, an obliquity which the fracture not unfrequently presents, and which is directed either from within downwards or outwards, or from without downwards and inwards; even this obliquity is always trifling."—p. 142.

It will be perceived that the author considers the line of fracture to be transverse, and that the lower fragment seldom passes the inferior surface of the upper, the ligaments being unruptured, and the ulna unbroken: how, then, does he account for the shortening of the radius, which almost always accompanies this injury? He says, page 138: "I admit that there is generally shortening of the radius, even in cases where the fracture is directly transverse; but in consequence of the peculiar mode of displacement of the lower fragment—a displacement which directs the carpal surface of the bone backwards instead of forwards, a displacement in which the carpal surface undergoes 'a mouvement de bascule'—the shortening is confined to the posterior surface of the bone; the anterior, so far from being shortened, sometimes measures even more than it did previous to the accident, although, certainly, it must be confessed that, to detect this increase, the utmost possible nicety of measurement is requisite." He refers also to the well-known anatomical fact that the posterior surface of the radius is longer than the anterior; in one specimen, which he alludes to, the latter was a quarter of an inch shorter than the former. Of two specimens of the fracture, which he cites, the posterior surfaces of the bone, in one, measured eight inches, and the anterior eight and a half inches; in the other, the surfaces are each eight inches long. In a tabular statement which is introduced in the course of his remarks, p. 156, this same difference of length in favour of the anterior over the posterior surface of the bone, in cases of the fracture under consideration, is observable. The table is based upon an examination of *twenty* cases, and *three* more are enumerated in the appendix. In one of these, the fracture was "nearly transverse;" in another, "oblique downwards and inwards;" in the remaining twenty-one, it was "transverse." In *four* of these cases, the length of the two surfaces was the same; in *eight*, the anterior exceeded the posterior in length by half an inch; in *ten*, by quarter of an inch; and in *one* by three-fourths of an inch: those two in which the fracture was more or less oblique offered an excess of half an inch in favour of the anterior surface.

The author combats successfully, we think, the opinion of M. Voillemier (*Archives Gén. de Méd.*, Mars, 1842), which supposes that all fractures of the radius, within an inch of its carpal surface, are instances of *impacted* fracture. The grounds upon which M. Voillemier urges this view are that, by the force which occasions the fracture, the upper fragment is driven into the cancellated structure of the lower, and that, "in all the specimens of fracture of the lower end of the radius, examined long after the accident which broke the bone, a line of compact tissue is found, covered over with cancellated structure, directed vertically, and descending to within a greater or less distance of the articular surface of the radius. This line is never double; it is continuous with the posterior wall of the bone when the lower fragment is thrown backwards, and with the anterior when this fragment is displaced forwards."—p. 144. Mr. Smith admits the accuracy of these statements of facts, but dissents from the inferences which M. Voillemier draws from them, on the grounds that no evidence drawn from *recent* fractures countenances the opinion, and that the theory demands a greater degree of shortening of the bone than is met with in Colles' fracture. He, therefore, thinks "that the impaction is only apparent, and that the compact tissue of the shaft is not found enveloped in bone, from its having penetrated the lower fragment at the time of the occurrence of the injury, but because it becomes subsequently encased in osseous matter during the process by which the bony union of the fracture is accomplished."

The remaining pages of this chapter are devoted to the description of the "fracture of the lower end of the radius, with displacement of the lower fragment forwards," and the "separation of the inferior epiphysis of the radius, with fracture of the lower extremity of the ulna." We shall not further allude to these.

There is one variety of fracture of the radius to which Mr. Smith does not refer. We mean that which was described by Dr. J. R. Barton, of this city, and of which the original account is contained in the *Phila. Med. Examiner*, vol. i. 1838. In this injury, "a fragment is broken off from the margin of the articular surface of the radius, carried up before the carpal bones, and rested upon the dorsal surface of the radius." "The fragment may be, and usually is, quite small, and is broken from the end of the radius on the dorsal side, and through the cartilaginous face of it, and necessarily into the joint. The pronator quadratus is not involved in the fracture. The radius and ulna are not materially disturbed in their relations to each other. The only important change which takes place in consequence of this fracture is, that the concave surface at the extremity of the radius, which receives and articulates with the first three carpal bones, is converted, as it were, into an oblique surface by the loss of a portion of its marginal ridge; commonly by the separation of an entire piece; sometimes by the crushing of its substance, &c." (*Op. cit.*, p. 366–7.)

The term "Barton's fracture" is commonly employed in this city, and, perhaps, in many parts of this country, as a sort of *patronymic* for all fractures of the lower end of the radius, very near the joint. This is a mistake. The paper of Dr. Barton makes no mention of any post-mortem evidence in favour of the reality of the lesion which he describes; but he styles it "a subluxation of the wrist, consequent to a fracture through the articular surface of the carpal extremity of the radius." Sometimes, though rarely, the line of fracture is from the *palmar* surface of the radius upwards into the joint, with displacement of the lower fragment upwards on the *anterior* aspect of the arm.

In chapter *fourth*, the author considers the subject of fractures of the humerus, in the vicinity of the shoulder-joint.—pp. 176–208.

The first of these injuries which he describes is that in which the solution of continuity has taken place through the upper part of the bicipital groove, thus detaching the *greater tubercle* of the head of the humerus. The injury is caused by a fall or severe blow upon the point of the shoulder, and the symptoms are such as to simulate a dislocation of the head of the bone; a tumour may be felt near the point; the acromion process of the scapula is unusually prominent; the breadth of the articulation is greater than that of the opposite joint; the elbow is somewhat raised from the side, and the power of the muscles over the arm and shoulder is impaired; sometimes, moreover, no crepitus can be detected. The diagnosis may be established by noting that, although the acromion is prominent, it is less so than when the head of the bone is removed from the glenoid cavity, nor can the finger be thrust beneath the process, as in dislocation; that the arm can be readily pressed to the side, if it is parted from the latter; that the motions are rarely so much impaired as in the luxation; that the most superficial tumour hardly corresponds in size and shape with the head of the humerus, that it is separated from another tumour on its inner side by a sulcus, and that this second prominence agrees in situation with the glenoid cavity, follows every motion impressed upon the arm, and, in short, is evidently the head of the humerus lying in its natural resting-place. The treatment of this injury consists in keeping the arm at rest, the elbow being supported, and in restoring the fragment to its normal position by means of a compress and bandage.

The next described form of injury is the *impacted* fracture of the neck of the humerus. The author says, p. 184: "The neck of the humerus is not unfrequently the seat of a fracture analogous, in many respects, to the impacted fracture of the cervix femoris. Of this form of injury I have seen two varieties, in one of which the upper extremity of the lower fragment, or a portion of it, penetrates the reticular tissue of the head of the bone; this is an *extra-capsular* fracture, and occupies the situation which, in the young subject, marks the junction of the epiphysis with the shaft; in the other, the superior fragment is forced downwards into the cancellated structure between the tubercles, the greater of which processes is, in almost every such instance, split off from the shaft of the humerus; in this case, the fracture is *intra-capsular*, and occurs through the anatomical neck of the bone." Again: "The diagnostic signs of fracture of the neck of the humerus, accompanied by penetration of the superior by the inferior fragment, are remarkably obscure, and the true nature of the injury is exceedingly liable to escape detection; there is but little deviation from the natural form of the shoulder, nor is there any *appreciable* alteration in the length of the limb. When the surgeon places one hand upon the shoulder, and with the other rotates the elbow, the head of the bone will be felt moving with the shaft; no satisfactory information is acquired by examining through the axilla, for although, perhaps, a slight irregularity may be felt near the junction of the neck with the head of the bone, it is usually so inconsiderable that it cannot be looked upon as affording positive evidence of the existence of a fracture in this situation." But there is a slight alteration of the natural contour of the shoulder, the motions of the arm are impaired, there are no sufficient evidences of luxation of the head of the bone, nor of fracture of the neck of the humerus, of the ordinary kind, and the injury has been occasioned by a violence inflicted upon the upper and outer part of the shoulder. The question may be decided by the development of crepitus, in the following manner: "Let the surgeon with both hands firmly grasp the head of the bone, and maintain it as nearly as possible in a fixed position, while an assistant rotates the elbow; by this method, crepitus can be produced in the great majority of cases."—p. 186. A drawing is appended, showing the appearances presented in such *extra-capsular impacted* fractures of the neck of the humerus.

"In the second form of this remarkable injury, the fracture is situated higher up, and traverses the anatomical neck of the bone, *within* the inferior attachment or base of the capsular ligament. It is a true *intra-capsular* fracture of the neck of the humerus, in which the head of the bone, or superior and smaller fragment, is driven into the inferior, or larger, between the tubercles, one or other of which processes is usually broken off from the shaft."

"The arm is slightly shortened, the acromion process projects more than natural, and the shoulder has lost, to a certain extent, its rounded form; the upper extremity of the shaft of the humerus is approximated to the acromion, and the entire of the globular head of the bone cannot be felt. In consequence of the fracture of the tuberosity, crepitus can be readily detected, when the shoulder is grasped with moderate firmness, and the arm rotated. The absence of a rounded tumour in the axilla, and the impossibility of feeling the glenoid cavity, are sufficient to enable us to distinguish this injury from luxation. With the ordinary fracture of the surgical neck of the humerus it would be scarcely possible to confound it, for in this injury the elbow is separated from the side, an evident depression exists two or three inches below the acromion process of the scapula, the upper end of the lower fragment projects towards the axilla, and the axis of the arm becomes oblique from above and within, downwards and outwards." We cannot glean from the text any diagnostic of this between the *intra* and *extra-capsular* impacted fractures excepting this, that in the former it is generally easier to elicit crepitus, in consequence of the detachment of one or both of the tuberosities, which complication more frequently attends the former than the latter.

There is no doubt that both of these varieties may be repaired by bony union of the fragments. Indeed, if the head of the humerus be severed by violence from its anatomical neck, even if there be no impaction, bony reparation may still take place, but probably in those cases only in which the capsular ligament has been more or less preserved. The circumstance of *impaction* increases the probability of this mode of union, because it enables the lower fragment to take a direct part in the work of depositing a blastema in which ossification may go on between the fragments. "The reparation of the injury," says the author, "is accomplished principally by the lower fragment, which throws out bony matter in great profusion, and frequently gives rise to irregular stalactiform productions, which encase, as it were, the superior fragment."—p. 190.

The following lines convey a most judicious and necessary caution. "The impacted fracture of the neck of the humerus always unites with a certain amount of deformity, which, indeed, from the very nature of the lesion, it is impossible to obviate; and, as regards the *intra-capsular* variety, it would be imprudent to restore to the joint its natural form, even were it in our power to accomplish it, for we would thus materially diminish the chance of the occurrence of osseous consolidation. It is, therefore, sufficient, in the treatment of such cases, to bandage the arm to the side, and to support the forearm in a sling; but the prudent surgeon will never omit to announce to the patient that a certain degree of impairment of the motions of the joint will be a permanent result of the injury."

A very remarkable peculiarity sometimes met with in cases of these impacted fractures is, that the head of the bone, or the upper fragment, is more or less completely turned in situation, so that its cartilaginous surface looks downwards, in a measure. Yet, notwithstanding this unfortunate position, strange to say, bony union has been known to occur between the fragments. Interesting examples and drawings illustrative of these various conditions are given in the author's pages, the results of his own observations and of those of others.

This chapter concludes with some observations concerning the "separation of the superior epiphysis from the shaft of the humerus." The chief and most interesting facts, or rather remarks, which we find, are the clearness of statement as to the anatomical situation of the epiphysis, and the correction of the mistakes of Sir Astley Cooper and Vidal (de Cassis) on this point. The author calls attention to the fact that, in separation of the epiphysis from the shaft, the line of severance falls *below the tuberosities*, so that the processes will form part of the upper fragment. There is rarely a failure in the reparation of this fracture by bony union, because the surfaces are so broad, and the fracture so transverse, that the fragments can scarcely be entirely separated from each other, excepting from extraordinary violence; and, again, because an abundant nutrition can be maintained from the superior, as well as from the inferior, fragment.—pp. 199–206.

The *fifth* chapter is devoted to the examination of "fractures of the acromial extremity of the clavicle."

According to most authorities, but very little, if any, displacement results from fracture of the clavicle, exterior to the coracoid process and to the coraco-clavicular ligaments. The internal fragment is, agreeably to these gentlemen, prevented from changing its line of direction, and maintained in its true position, by the conoid and trapezoid ligaments, and the outer is likewise held *in sitû* by the acromio-clavicular attachments; while the deltoid and trapezoid muscles, acting in opposite directions, neutralize each other's disturbing powers. Mr. Smith dissents from this opinion, thinking that its supporters "have been too much influenced by reasoning upon the anatomy of the parts concerned, and have not devoted sufficient attention to the phenomena disclosed by the post-mortem examination of the injury under consideration."—p. 210. His investigations have been conducted upon eight specimens; in five of these, the bone had been broken between the trapezoid ligament and the acromion process. In the remaining three, the fracture was situated between the conoid and trapezoid ligaments. A brief history of these cases is presented in the text, and to some of them illustrative drawings are appended. His inferences, drawn from the symptoms and post-mortem appearances of these examples, may be thus summed up: "When the bone is broken between the coraco-clavicular ligaments, it is manifest that, if these structures have not been injured, there can be but little displacement of the fragments, according to the thickness of the bone, although there may be a slight derangement as regards its direction. The trapezius muscle will tend to draw the extremity of each fragment upwards, as the conoid and trapezoid ligaments will permit, and thus to increase the natural curve of the clavicle at the seat of the fracture. The convex form of this portion of the bone, superiorly, assists the trapezius in counteracting the tendency of the deltoid muscle to depress the fragments. The weight of the arm may cause a slight sinking of the outer fragment below the level of the inner; but, as this displacement, for obvious reasons, can seldom be carried so far as to enable the broken surface of one fragment to clear that of the other, the overlapping of the two portions of the bone must necessarily be an exceedingly rare occurrence."—p. 215.

But, when the fracture is external to the trapezoid ligament, the outer fragment becomes acted upon in two opposite directions. By the trapezius muscle, its inner extremity is drawn upwards and outwards, while the weight of the shoulder, and the muscles which most powerfully affect the position of the latter, throw its outer, or acromial end, downwards and inwards. Another source of derangement of the outer fragment exists in the revolutionary movement upon its axis which the scapula is made to undergo, by the weight of the shoulder acting upon its superior external extremity, and by the greater rhomboid muscle drawing its inferior angle towards the spine. The effect of these combined forces and influences upon the outer fragment of the broken clavicle is to direct it so that a right angle is formed by the two fragments at their point of contact, the line of the inner portion of the bone remaining unchanged in its direction, while the axis of the outer inclines, from within, downwards, forwards, and outwards, and is somewhat in front of the other without overlapping it.

In both cases, crepitus may generally be produced by moving the fragments in opposite directions. In the reparation of this fracture, bony matter is very freely deposited upon the under surface of each fragment, rarely upon the upper surface of either. The ossific formation sometimes is so profuse as to constitute bony props extending from the clavicle to the coracoid process of the scapula, and even to the notch; and sometimes anchylosis is thus established between the scapula and clavicle.

In the sixth chapter, dislocations of the bones of the foot are noticed, and particularly "a dislocation of the metatarsus and internal cuneiform bone upwards and backwards upon the tarsus."—pp. 224–237.

Lastly, chapters are devoted to the subjects of congenital dislocations of the wrist and shoulder-joints, and of the lower jaw.—pp. 238–293. In these, the author has diplayed the same accuracy and minuteness of examination which characterize the preceding chapters. He has added new facts to the records of science, and has more clearly explained the conditions upon which these rare and interesting deformities depend.

Mr. Smith's treatise may be considered one of our best models for conducting surgical observations. Since we first read Sir Astley Cooper's classic work on Dislocations and Fractures, we have met with no volume on the same subjects which has afforded us so much pleasure and instruction as this. And it is but due to the author to say that, in many instances, and in the more limited range of his topics of study, his treatise displays a more thorough and strict research, and greater power and quickness in argument, than that of the other celebrated surgeon. It has strengthened our conviction of the excellence of the Dublin "School" of Medicine. F. W. S.

ART. XII.—*On Infantile Laryngismus, with Observations on Artificial Feeding, as a frequent cause of this Complaint, and of other Convulsive Diseases of Infants.* By JAMES REID, M.D., Member of the Royal College of Physicians of London; Physician to the General Lying-in Hospital, and to the Infirmary of St. Giles and St. George, Bloomsbury; formerly Lecturer on Obstetrics and the Diseases of Women and Children. London, 1849: 12mo. pp. 204.

ALTHOUGH a disease of frequent occurrence in all large cities, and one marked by symptoms strikingly characteristic, it is somewhat remarkable that infantile laryngismus should only recently have attracted the attention of the profession to an extent which its importance and dangerous character demand.